Effectiveness of Culturally Tailored Interventions for Hispanic Adults with Type 2 Diabetes Mellitus

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Abstract

Introduction/Background: Diabetes is the 7th leading cause of death in the United States (CDC, 2020) and Hispanic American population has a high prevalence of type 2 diabetes (CDC, 2020).

Purpose: The purpose of this study was to conduct a systematic literature review to examine the effects of the culturally tailored interventions on improvements of glycemic control HbA1C and health-related quality of life among Hispanic American adults with type 2 diabetes.

Methods: PUBMED and CINAHL databases were used to conduct the literature search on culturally tailored diabetes interventions for Hispanic Americans with type 2 diabetes. Inclusion criteria included the articles published in the past 10 years, English language, peer reviewed, the sample population of Hispanic American adults, and diabetes interventions.

Results: Ten articles met the criteria. The culturally tailored intervention strategies included low literacy level educational material, bilingual community healthcare workers, Hispanic dietary options, and family/social support. These interventions improved health-related quality of life and glycemic control**.**

Conclusion: Healthcare providers should integrate family and social support in the care of Hispanics with type 2 diabetes. Diabetes intervention strategies should consider bilingual healthcare workers as navigators and the use low literacy level educational material.

Introduction

In the United States, 34.2 million people or 10% of the total population has diabetes, and 21.4% of the total number of people with diabetes are undiagnosed (CDC, 2020). Diabetes is the 7th leading cause of death in the United States (CDC, 2020). The risks of this disease can cause secondary diseases such as heart failure, vision loss, and kidney failure (CDC, 2020). Diabetes can be prevented through a healthy lifestyle (CDC, 2020). Type 2 Diabetes can be prevented or improved by losing body weight, being on a healthy diet, being physically active, and self-monitoring of blood sugar regularly (CDC, 2020). However, there are about a third of the population with prediabetes that are unaware of their risks, which can lead to developing to diabetes (CDC, 2020).

Diabetes spans through many parts of the world, specifically among Hispanic Americans. In fact, Hispanic Americans are twice as likely to be diagnosed with type 2 diabetes (12.3%) than White Americans (OMH, 2019). According to the 2020 Centers for Disease Prevention and Control (CDC) Report on diabetes, 14% of the American Hispanics were diagnosed with diabetes including 3.5% who are undiagnosed and 10.5% are diagnosed (CDC, 2020). And for over the age of 18 years, 12.5% of the Hispanic population was diagnosed with diabetes compared to whites with 8% (OMH, 2019). Complex risk factors contributed to health disparities in Hispanic Americans with type 2 diabetes. Diabetes complications such as visual impairment, lower extremity amputations, and end stage renal disease (OMH, 2019). Hispanics are 33% more likely to be admitted in the hospital than Non-Hispanic Whites for end stage renal disease which later leads to death (CDC, 2020). Approximately 94% of the Hispanic population are less likely to get their feet checked resulting in about 50% of them getting their lower extremities amputated (OMH, 2019). Risk factors associated with diabetes include obesity, cigarette

smoking, high cholesterol, and hypertension (CDC, 2020). Additionally, the lack in healthcare access and the knowledge of the disease itself leads to many Hispanics with type 2 diabetes being untreated or delayed in receiving care (OMH, 2019). When they are diagnosed with diabetes, they are not well educated about how to manage the disease (AHRQ, 2017). The deficiency in learning opportunities has resulted in a higher rate of prevalence (Testerman, 2017). The Hispanic population is disproportionately affected by the socioeconomic factors of low income living, lack of access to healthcare providers, difficultly seeking adequate amounts of food, and poorer housing quality (Testerman, 2017)

Self-management requires the monitoring of the glucose level, diet, exercise, and proper medical treatment (ADA, 2020). Many of the Hispanic population do not assess their glycemic level on a daily bases (Vincent, 2009). Diet can be changed in order to regulate their glycemic levels as the diet for the Hispanic population is different from the average diet due to the location and culture views (Ramal, 2018). The diet that Wang and colleagues (2016) recommended in their study was consumption of more fiber intake, increase monosaturated fat, and decrease the sugar intake. When making these dietary changes the research team provided different healthy ideas and facts about the foods to better educate the Hispanic Adults (Wang, 2016). When having those educational details available for the Hispanic population, they were able to help manage their diabetes and improve their glycemic levels (Wang, 2016). Having education and information to assist with diabetes self-management is important when trying to improve self-management of diabetes. Especially for a group of Hispanics Americans who have a high risk of getting this disease (Brown, 2018).

Additionally, interventions using family support and social support are aiding in improving the self-management of glycemic control and health-related quality of life. A study

conducted by Hu and colleagues (2016) examined a family-based intervention to improve glycemic control and health-related quality of life. In this study the patients and family members attended the educational support sessions. The study concluded that having family members in the intervention improved short-term HbA1c in patients and the health-related quality of life in family members because the family members provided support to the patient with type 2 diabetes and helped with self-management of diabetes (Hu, 2016). Having a supportive family member can help with improvements in health-related quality of life of both family member and patient with diabetes.

The glycemic control is monitored with diabetes self-management of diet, self-monitoring blood glucose, and regular exercise (Kenya, 2014; Soto, 2015). These factors have shown to have brought the glycemic levels in control. In the study by Kenya and colleagues (2014), they examined how self-monitoring glucose helped with glycemic control along with the help of community healthcare workers (CHW) and educational sessions. They found that the mean average of the HbA1c level had a decrease from 10.04% to 8.8% over a 12-month period (Kenya, 2014). This study showed that the use of CHW and the educational sessions helped Hispanic population adapt to new habits and better glycemic control (Kenya, 2014). Interventions that are solely based on individual capabilities is not as effective as a support person being there to help achieve their goal of a better quality of life (Soto, 2015). The study conducted by Soto and colleagues (2015) on self-management with primary care professionals showed improvement in glycemic control (Soto, 2015). The results showed that the use of an educator or support person helped in improving the glycemic control (Soto, 2015). Healthy diet, exercise, family/social support and education contribute to glycemic control.

Diabetes self-management education is the key in glycemic control. According to the American Diabetes Association (ADA), the Diabetes Self-Management Education (DSME) is a program that provides a foundation of providing diabetes knowledge and skills for patients to improve their health outcomes. (ADA, 2020). The DSME program help in educating the participant in different areas of diabetes self-management including nutrition, diabetes knowledge and psychological coping skills (ADA, 2020). In the joint position statement on DSME and support (Powers, 2015), researchers evaluated the effectiveness of the DSME program on improving HbA1C levels, eating habits, diabetes knowledge, and psychological coping (Powers, 2015). The use of the DSME program helped in improving the glycemic levels, by understanding the need of support systems and having participation of family members and healthcare workers in assisting with self-management skills (Testerman, 2017).

Despite the improvement with the DSME in quality of life and glycemic control identifying culturally tailored interventions for Hispanic American adults is important for diabetes education and research. The purpose of this systematic review was to further examine the effects of the culturally tailored interventions in the Hispanic adults with type 2 diabetes on improvement in the glycemic control (HbAlc) and health-related quality of life.

Methods

Search Strategy

This systematic review examined the effectiveness of culturally tailored interventions for Hispanic adults with type 2 diabetes mellitus. This research, a systematic review was conducted by searching intervention studies using the following databases: *PubMed,* and *CINAHL*. When searching for the articles, the key terms that were used were diabetes mellitus type 2", Hispanic

American adults, interventions, family support, glycemic control, diet, physical activities, depression, mental state, and self-management.

Inclusion and Exclusion Process

When searching for articles, multiple articles were found from each database. The articles were then selected based on the inclusion criteria: time frame of 2009-2020, English language, peer reviewed, and the sample population of Hispanic American adults. The articles that were collected from the databases went through a process of elimination using the Preferred Reporting Instrument for Systematic Reviews or Meta-Analyses (PRISMA) protocol (Figure 1) (Moher, 2009). The articles were first selected based on the title relating to the topic, then articles were excluded because they were repeating articles, or the content was not credible. Next, articles were chosen based on the content being about interventions specifically to help prevent Type 2 Diabetes, the sample population was Hispanic adults. Lastly the articles were narrowed down based on the information relating to nursing interventions specifically for Type 2 diabetes in Hispanic American adults. Once the articles were finalized, the information from each article was entered in a table with the following sections: the author, sample size, the design, characteristics of the interventions, what culturally tailored interventions used, and how the data was collected (Table 1).

Risk of Bias

Along with screening the articles for specific information, the articles were screened for bias based on the Cochrane guidelines (Higgins, 2011). Each article was assessed based on five domains: selection, performance, attrition, reporting and other bias. Within each domain the articles were judged based on high (if there was bias), low (minimum to none bias), and unclear

bias (if the article has didn't include the information). The articles were reviewed by the author and the mentor independently. If there were any disagreements about the articles they were resolved through discussion.

Results

Figure 1 shows the PRISMA diagram for the study selection, in which 86 records were retrieved from *PUBMED, and CINAHL.* After removing the duplicates, 70 articles remained. After the screening, 49 articles were selected for full text review. Ultimately, 10 of the 49 were eligible for inclusion in this systematic review.

Table 1 displays the characteristics of the interventions included in the systematic review. The publication dates varied from 2008-2019. Eight of the 10 articles were randomized control trials (Carrasquillo, 2017; Mansyur, 2016; McEwn, 2019; Palmas, 2014; Pena-Purcell, 2019; Philis-Tsimikas, 2011; Spencer, 2018; Vincent, 2009) and the remaining two were quasi-experimental studies (Hu, 2015; Hu, 2016). All the articles recruited Hispanic Adults with type 2 diabetes mellitus. The mean age of the group was 55.3 years of age and 55% were female participants.

The interventions were varied in the setting, structure, contact hours, and the person providing in the intervention. The settings included in the studies were primary care offices, churches, healthcare education clinics, and patient homes. The number of contact hours varied from 2 hours to 8 hours. Four articles used group-based interventions (Carrasquillo, 2017; Hu, 2016; Philis-Tsimikas, 2011; Vincent, 2009), three used individual interventions (Hu, 2015; Mansyur, 2016; Pena-Purcell, 2019) and three used a mixture of group and individual sessions (McEwn, 2019; Palmas, 2014; Spencer, 2018). Interventions were provided mostly by

Community Health Workers (CHW) or promotras, nurse educators, and the primary care providers.

All of the studies used interventions that were culturally tailored towards the Hispanic adult population. The cultural adaptions provided were dietary preferences, education material based on a low literacy level, and bilingual community healthcare workers (CHW) who conducted group activities and phone calls (Carrasquillo, 2017; Hu, 2015; Hu, 2016; Mansyur, 2016; McEwn, 2019; Palmas, 2014; Pena-Purcell, 2019; Philis-Tsimikas, 2011; Spencer, 2018; Vincent, 2009).

All studies included in the systematic review assessed the HbA1c levels. Two studies specifically compared the changes of the HbA1c from the baseline to post-intervention (McEwen, 2019; Spencer, 2018). Another three studies compared the HbA1c of the control and intervention group from pre-intervention to post-intervention (Carrasquillo, 2017; Hu, 2016; Philis-Tsimikas, 2011).

Six studies in the systematic review reported quality of life QOL as an outcome (Hu, 2015; Mansyur, 2016; Pena-Purcell, 2019; Philis-Tsimikas, 2011; Spencer, 2018; Vincent, 2009), with the use of several assessment tools. QOL was measured with the use of the Medical Outcomes Study Short Form Health Survey Version 2 (SF-12) (Hu, 2016), the Diabetes Care Profile (Mansyur, 2016). Three out of the six studies evaluated the difference in diabetes-related health outcomes in the intervention group and the control group (Mansyur, 2016; Spencer, 2018; Vincent, 2009), while the other three studies examined health-related quality of life outcomes at baseline, post-intervention and follow-ups (Hu, 2015; Pena-Purcell, 2019; Philis-Tsimikas, 2011). All six studies showed improvement in the health-related quality of life (Hu, 2015; Mansyur, 2016; Pena-Purcell, 2019; Philis-Tsimikas, 2011; Spencer, 2018; Vincent, 2009) and

two studies specifically discussed the changes in self-efficacy of the participants in self-management of diabetes (Philis-Tsimikas, 2011; Vincent, 2009).

Bias and Quality Assessment Results

The risk of bias was low for majority of the studies assessed for this systematic review. Risk of selection bias was high as only two reviewers analyzed the articles with the use of criteria set before the selection process. Risk of selection bias due to random sequence generator was high for one study, unclear for one study and low for eight studies. Allocation bias was unclear for seven of the studies and low for three other studies. Four had unclear performance bias, and all had low detection bias, and reporting bias.

With majority of the articles being randomized control trials, the general evidence was assessed per the Grades of Recommendation, Assessment, Development and Evaluation (GRADE) criteria, an evaluation for the quality of the body of articles or the evidence in a study. The evidence was scored to be high quality evidence (Higgins, 2011). One point was taken away as there was diversity in the study findings. Therefore, the overall quality of the evidence was graded to be moderate.

Figure 1

PRISMA 2009 Flow Diagram

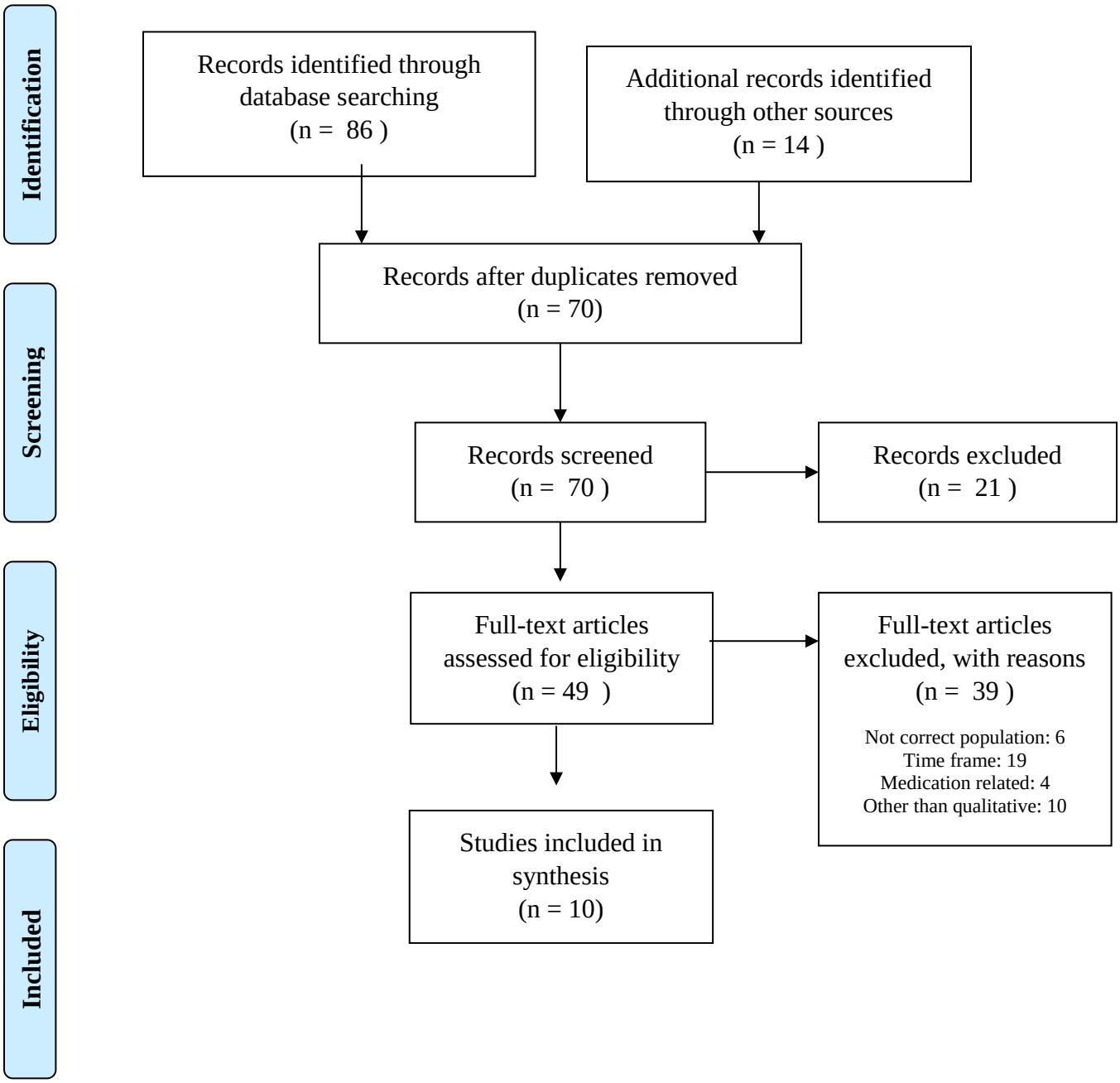

Table 1: Synthesis of Studies

Citation	Sample (N)	Female (%)	Mean Age	Study Design	Intervention Characteristics	Control Group	Cultural Tailoring	How the Measures were Collected
Carrasquillo, O., et al. 2017	300	55%	55.2 years	RCT	52 week study. Community Health Workers. Intervention group received 4 home visits, 20 telephone calls, monthly group activities.	Received regular health care from primary care provider.	Yes, Spanish Speaking Community Healthcare Workers (CHW)	HbA1C collected at 1st appointment and then last appointment
Hu, J., et al., 2015	131	63%	50.1 years	Quasi-Experiment	Physical activity was measured with the International Physical Activity Questionnaire (IPAQ) and pedometers. Self-report of physical activity was collected pre- and postintervention, and pedometer data for the 8 weeks of the intervention period.	N/A	Yes, Spanish language, low-literacy informational handouts and instructions. family members for support	IPAQ pre/post intervention. Each week (7 days) the steps were collected
Hu, J., et al., 2016	186	59%	49.4 years	Quasi-Experiment	8-week intervention program with intervention and control group. The intervention group received weekly sessions of 1.5 hours of contact education.	Received general health promotion information and two session diabetes self-management education	Yes, Spanish low-literacy level handouts.	Pre and post tests were completed. For each outcome-IPAQ, DSME, Blood sugar, Likert scale for family support

Mansyur, CL., et al., 2016	248	50%	50.8 years	RCT	2 year program where the CHW used phone calls, education information about diet, physical activity.	Usual medical care	Yes, Spanish speaking CHW, Spanish low-literacy level language material.	Baseline data collected with survey about the self-efficacy, care, management, and post intervention assessment
McEwn, MM., et al., 2019	157	65%	53.5 years	RCT	The 12-week intervention program included 3 successive components: (1) six 2-hour educational and social support group sessions conducted weekly for 6 weeks, (2) three 2-hour home visits scheduled weekly for 3 weeks, and (3) three 20-minute telephone calls scheduled weekly for 3 weeks.	Two-hour education sessions for three weeks	Yes, Spanish Speaking CHW, Spanish low-literacy handouts.	Collected at baseline, 3 months post and 6 months post
Palmas, W., et al., 2014	360	61%	57.6 years	RCT	12 month intervention randomized into CHW or EUC. Phone intervention along with one on one visits, group visits	Follow up with PCP, as well as received Spanish-Language educational material every four months	Yes, Spanish low-literacy level educational material, Spanish speaking CHW.	Baseline HbA1C and then at 12 months

Pena-Purcell, N., et al., 2019	137			RCT	8 week intervention using a pre and post test research design	Usual medical care	Yes, Spanish speaking primary care provider, researchers	Baseline and posttest assessments were conducted at 1 week and 7 week of intervention
Philis-Tsimikas, A., et al., 2011	207	66%	52.2 years	RCT	8-weekly 2 hours classes, and support groups led by promotras.	Usual medical care	Yes, Spanish speaking Promotras (CHW)	HbA1c checked at baseline, 4 months after, 10 month postintervention
Spencer, MS., et al., 2018	222	60%	48.9 years	RCT	18 month intervention study. First randomization EUC or CHW. After 6 months randomization of CHW group to CHW only and CHW+PL. CHW got 80 hours of diabetes education. Two 60 minute home visits and one clinic visit. Eleven 2 hour group sessions biweekly.	Received 2 hour classes and contacted once a month	Yes, Spanish speaking CHW, Spanish low-literacy level educational material.	Assessments conducted at 6, 12, 18 months of HbA1C levels.
Vincent, D., 2009	20	71%	56 years	RCT	8 week intervention, with 2 hour group sessions	Received usual care and education given at the clinic	Yes, Spanish speaking researchers, Spanish low-literacy level educational material.	HbA1c collected at baseline, postintervention and 4 months postintervention.

Discussion

This systematic review provides evidence to support the use of culturally tailored diabetes self-management interventions for the Hispanic American adults that have improved glycemic control and health-related quality of life (HRQOL) through family support, lifestyle behavioral changes in in physical activities and healthy eating. In the systematic review of the studies, the use of Spanish speaking community healthcare workers (CHW) or Promotras, low literacy and Spanish language education material as well as the modified cultural food habits showed improvements in the HRQOL and glycemic control (HbA1c).

Glycemic Control

The glycemic control on average was measured at baseline or pre-intervention and post intervention. For the studies that examined HbA1c levels showed an average decrease by 0.84% from the pre-intervention to the post-intervention (Carrasquillo, 2017; Hu, 2016; McEwen, 2019; Philis-Tsimikas, 2011; Spencer, 2018). The decrease in the HbA1c level demonstrated that the use of culturally tailored interventions, for example, Hispanic dietary options, Spanish low-literacy level educational material, and family support help improve glycemic control (Carrasquillo, 2017; Hu, 2016; McEwen, 2019; Philis-Tsimikas, 2011; Spencer, et, 2018).

The intervention strategies that improved glycemic control were the use of community health workers (CHW) who spoke Spanish and used low literacy Spanish language education material to facilitate the group sessions. The CHW helped in explaining the information about management of HbA1C (Carrasquillo, 2017). In the study by Carrasquillo and colleagues (2017), the use of support from the CHW helped provide a decrease in the level of stress for managing the glucose levels because the participants felt more comfortable in managing their diabetes

(Carrasquillo, 2017). Another study by Spencer and colleagues (2019), showed the reduction of the HbA1C levels with the support of CHW and family members as they provided reminders and information about controlling diabetes through healthy diet, and exercise. (Spencer, 2018). The use of support and education material showed improvements in the control of the glycemic control.

Health-Related Quality of Life

The health-related quality of life (HRQOL) was measured using a variety of scales that showed improvements in the perception of HRQOL among participants in the studies (Hu, 2015; Mansyur, 2016; Pena-Purcell, 2019; Philis-Tsimikas, 2011; Spencer, 2018; Vincent, 2009).The greatest change shown was in having confidence to manage their diabetes. Different types of interventions were provided with the use of family/social support, and educational material delivered by CHW (Mansyur, 2016). In the study by Mansyur and colleagues (2016) the participants had the support of a family in everyday activities and provided educational material to help improve diet and exercise. The support the participants received from their family members helped them feel confident as they had someone else with them on diabetes management (Mansyur, 2016). Another study by Vincent (2009) showed that the use of support and educational material can reduce the distress of diabetes as the participants built their confidence through the support of family. In the Hispanic culture, family support can strengthen the commitment the participant had to improve their health (Vincent, 2009). With the support of the families and education material provided by the CHW, the health-related quality of life for diabetes was improved (Hu, 2015; Mansyur, 2016; Pena-Purcell, 2019; Philis-Tsimikas, 2011; Spencer, 2018; Vincent, 2009).

Physical Activity and Diet

The interventions that improved the physical activity (PA) and diet through educational sessions and family support (McEwen, 2019; Hu, 2015). The participants in the studies were provided educational material to guide them in controlling risk factors related to diabetes. In the study conducted by McEwen and team (2019), the group educational sessions on different exercises and dietary options were tailored to the Hispanic cultural preferences (McEwen, 2019). These educational topics discussed in the sessions helped build the knowledge of understanding the benefits of diabetes self-management (McEwen, 2019). Another study focused on physical activity, on which Hu and team (2015) examined the improvement of physical activity of walking in the participants. They found that the use of a physical motivator, a pedometer and family support, helped the participant improve their self-efficacy levels (Hu, 2015). Diet and physical activities are factors that contribute to the reduction of complications related to diabetes and confidence in diabetes control (McEwen, 2019; Hu, 2015)

Culturally Tailored Interventions

This systematic review examined the different culturally tailored interventions for the Hispanic adults to improve glycemic control and health-related quality of life (Carrasquillo, 2017; Hu, 2015; Hu, 2016; Mansyur, 2016; McEwn, 2019; Palmas, 2014; Pena-Purcell, 2019; Philis-Tsimikas, 2011; Spencer, 2018; Vincent, 2009). Preferences for food were based on their cultural dietary habits and education on healthy eating was provided in group sessions in the Spanish language. All the educational materials about glucose monitoring, physical activity benefits, diet benefits, and general education about diabetes were developed with the understanding a low literacy level, as many of the participants were from a low-level educational background. All of the materials were delivered with the help of bilingual/bicultural Spanish

speaking community healthcare workers or promotras. All of these interventions were developed tailored to the Hispanic culture based on their language and education level. (Carrasquillo, 2017; Hu, 2015; Hu, 2016; Mansyur, 2016; McEwn, 2019; Palmas, 2014; Pena-Purcell, 2019; Philis-Tsimikas, 2011; Spencer, 2018; Vincent, 2009).

Limitations

There are several limitations of in the systematic review. The use of small number of studies (10) limits generalizability of the findings to the target population. Also, the measures of the study outcome variables varied from study to study resulting in difficulty comparing between studies. The studies showed publication bias. Another limitation was that not all of the studies are randomized clinical trials (RCT) resulting in bias, as the participants were not randomly assigned to intervention or control group. While there were limited RCT studies, there were two quasi-experiments in the study which can result in bias. Lastly, there may have been multiple studies missed during the process of conducting this systematic review.

Conclusions

Significant health disparities in diabetes still remain in Hispanic adults with type 2 diabetes. This review examined the effective culturally tailored interventions on the improvement of glycemic control and health-related quality of life. The results collected in this systematic review showed effective and culturally tailored intervention strategies in diabetes self-management in this vulnerable population. Healthcare providers should integrate family and social support in the care to Hispanics with type 2 diabetes. Diabetes intervention strategies should consider bilingual healthcare workers as navigator and the use low literacy level educational material.

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